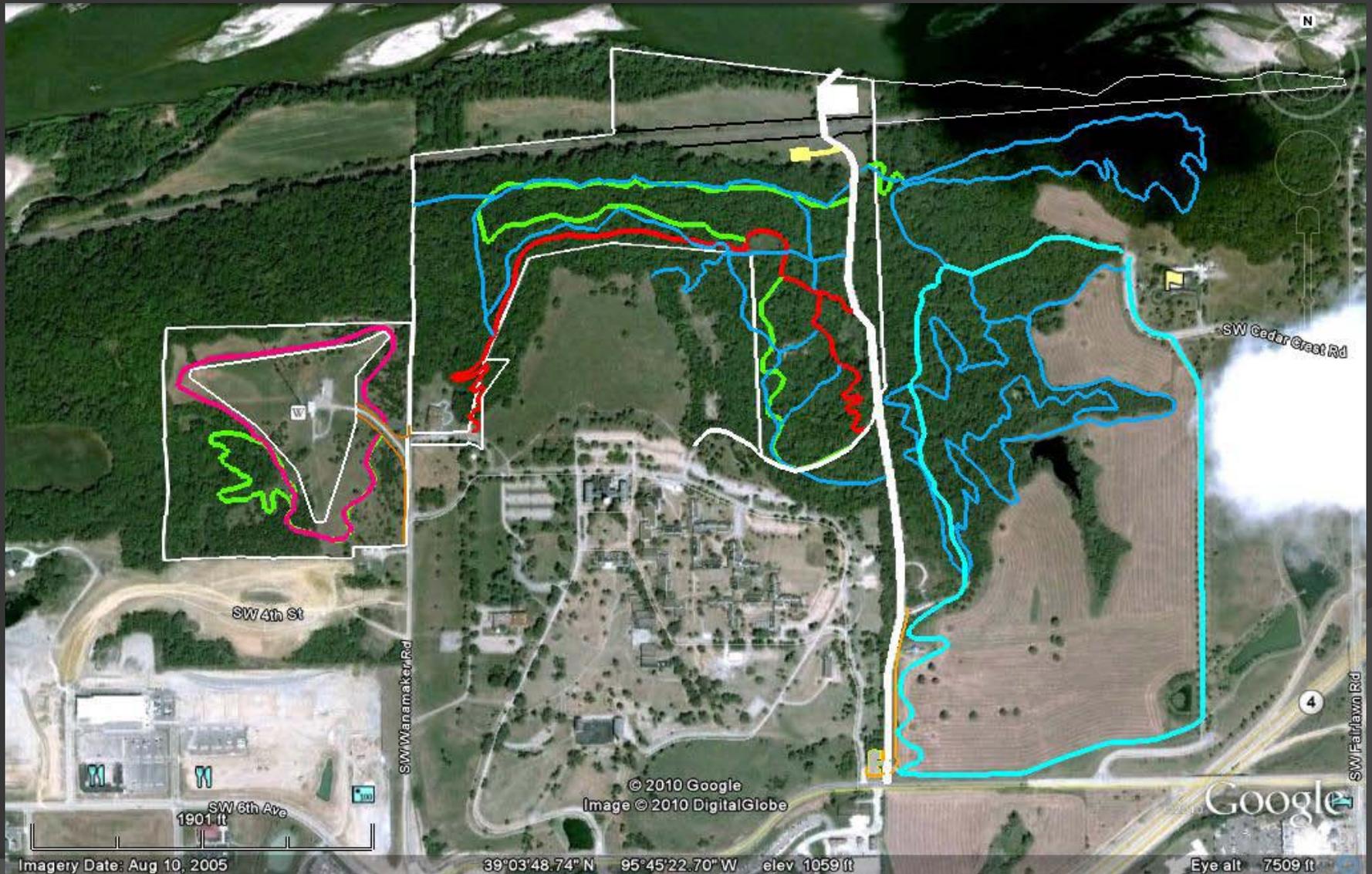


DOUBLE-WIDE TRAILS AT KAW RIVER STATE PARK

Double-wide Trails at Kaw River SP



Kaw River State Park & Vicinity, Topeka, KS



Kaw River State Park Trails

Why “Double-wide” ?

6' Surface with 10' Corridor



**More room for multi-use
Access for construction
Access for maintenance
Access for emergencies**

**Equipment
Materials
People**

Double-wide Contour for Sustainability



Rolling Contour Trails

Avoid the Fall Line

Avoid Flat Areas

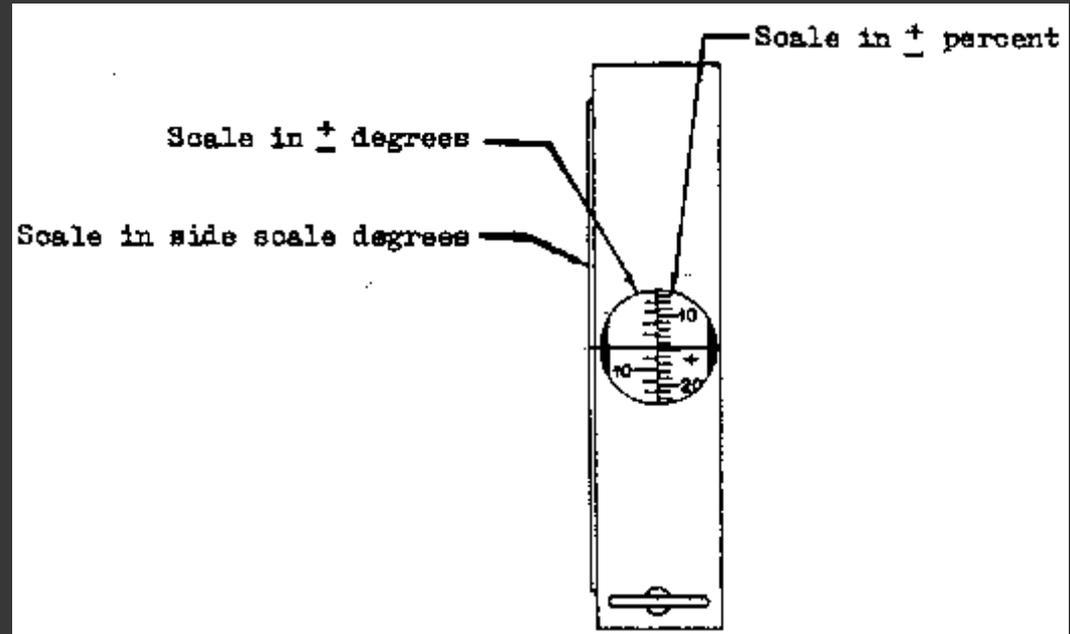
Five Essential Elements:

- Half Rule: grade % < $\frac{1}{2}$ of side slope %
- Ten Percent Average
- Maximum Sustainable Trail Grade
- Grade Reversals: small ups and downs
- Out slopes 5% for drainage (ADA 5 %)

Clinometer



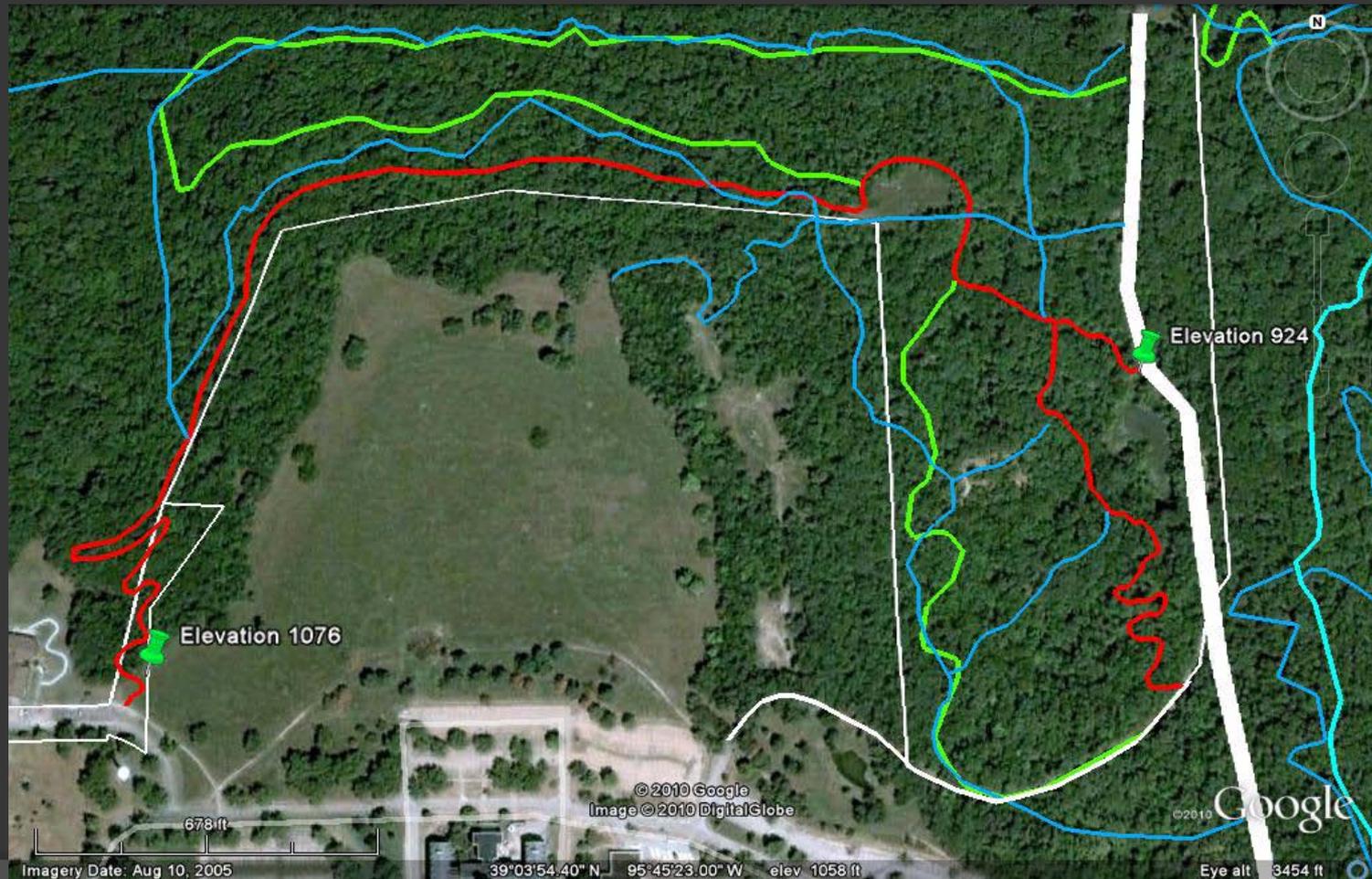
Suunto clinometer



Use percent scale on right
Sight to a point at height of your eye

Ten Percent Average Guideline for Sustainability

- Trail head 1076' - trail head 924' = 152' elevation (rise)
- Length $\frac{3}{4}$ ml. = 3960' (run)
- $\text{rise/run} = 152 / 3960 = .0384 \times 100 = 3.8\%$ Average Grade





Follow the 5 Elements of trail building to prevent this.

1. The Half Rule
2. The Ten Percent Average guideline
3. Maximum Sustainable Trail Grades
4. Use Grade Reversals
5. Out-slope
6. Get a Clinometer and use it!

Construction



Flagged Trail- layout in winter



**After tree removal
Next is stumps**

Construction



Rough-in the trail



Throw debris to downhill side and spread it out

Construction



Trail roughed-in



Add rolling dips

Construction



Rolling Dip



Mound up dirt on downhill side of dip.



Construction

Smooth dirt and add gravel base.

Avoid tree damage



Gravel Base: Recycled crushed concrete

Mixture of sizes

Avoid dirt

Avoid round shape

Packs nicely but tracked
vehicles will move it

Cheaper than rock

Must be topped with packed
crusher fines of angular shape
3/8 and minus.

How to build trail where you can't:

Rock Gabions



Gabions



**Dig out bed:
Level, and then tip back**



**AB3 packed bed with
gabions ready to fill**

Gabions



Fill cells gradually and
install corner wire supports



Hand place rocks
(4" ditch liner)

Gabions



Side slope



Full with top wired down

Gabion wall in use



Drainage Problems



Get the water off the trail



**Rolling dips, nicks, drains,
culverts, bridges**

French Drains



Dig trench and lay down 4”
corrugated drain tile/tube



Secure ends with grates
to keep animals out.

French Drains



Fill with clean lateral rock first, top with small rip-rap or ditch liner.



Extreme wet area with 9 drains.

Culvert Pipes



“Bridges”

less than 20' = not a “bridge” per
federal regulations



Trail Bridges at Kaw River SP



Using gabions instead of concrete for abutments.



Dig trench, provide a level packed base.

Bridges



**Gabion nearly full and
beam plate in place**



Beams set and assembled

Bridges



Angle iron to bolt beams together



Treated wood plates on top of beams; handrail support beams underneath

Bridges



Decking (first layer)

Bridges



Second layer for higher load capacity – equipment
Protect ends of deck boards

Bridges



Install handrails and curbing- watch for splinters, staples, knots
Handrails at 48", 34", 15"

Bridges



Support the handrails ! And protect hands from sharp edges, bolts

ADA Proposed Guidelines for outdoor recreation areas, trails

Surface firm and stable

Openings < 1/2" and perpendicular or 1/4"

Protruding Objects w/ 80" clear head room

Tread obstacles up to 2" max (conditions)

If tread less than 5' wide, provide passing space every 1000'

Continued...

ADA Proposed Guidelines

Running Slope: no more than 30% of trail can exceed 8.33%

- < 5 % for any distance

- 5 % to 8.33 % with resting area every 200'

- 8.33 % to 10 % with resting area every 30'

- 10 % to 12.5 % with resting area every 10'

Exception: 14 % for 5 feet in open drain structure, cross slope of 5% or less (rolling grade dip)

Continued...

ADA Guidelines

Cross Slope:

Concrete, asphalt, boards 2 %

Other surfaces 5 %

Resting Intervals 60" long, less than 5%
slope in any direction

Edge Protection: where provided, 3" min.

Gates & Barriers: see other sections

Continued...

ADA Guidelines

Trail Signs: shall include...

Length of trail

Surface type

Typical and minimum tread width

Typical and maximum running slope

Typical and maximum cross slope

Good Books

Trail Planning, Design, and Development Guidelines , 2006, State of Minnesota, Department of Natural Resources

Trail Solutions , 2004, International Mountain Biking Association

Both available from American Trails

www.americantrails.org

Another Good Book

For land managers, park managers,
homeowners, etc.

The importance of using native plants in all
environments including parks, homes, etc.

Bring Nature Home , Doug Tallamy 2007,
Timber Press

available from Timber Press, Powell's Books,
Amazon

American Trails Conference

2010 American Trails National Symposium

Chattanooga, TN

November 14-17

QUESTIONS & ANSWERS

EASY QUESTIONS - free

TOUGH ONES - \$5

REALLY TOUGH ONES – go buy a book

Take a hike!

Trails Field Day 1:45 p.m. to 4p.m.
Meet in the lobby and car pool

Next Conference and/or Trails Workshop

Trail GPS, mapping, and brochure
development

Trail audits

What would you like to know about?